Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period: \_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_

**Acid/Base Practice Problems**

These mostly titration-related problems are designed to help you practice for your Acid/Base Quest. Good luck!!!

1. For each of the following acid-base titration combinations, determine the number of moles of the first substance listed that would be the chemically equivalent amount of the second substance.
   1. NaOH with 1 mol HCl
   2. HNO3 with 0.75 mol KOH
   3. Ba(OH)2 with 0.20 mol HF
   4. H2SO4 with 0.9 mol Mg(OH)2
2. Suppose that 15.0 mL of 2.50 x 10-2 M aqueous H2SO4 is required to neutralize 10.0 mL of an aqueous solution of KOH. What is the molarity of the KOH solution?
3. What is the molarity of NaOH if 20.0 mL of the solution is neutralized by each of the following 1.0 M solutions?
   1. 28.0 mL of HCl
   2. 17.4 mL of H3PO4
4. The following data were collected from a titration of 50.0 mL of ethanoic acid (CH3COOH) of unknown concentration with 0.100 M NaOH. Plot these data to obtain a titration curve. Place pH on the y-axis.

|  |  |
| --- | --- |
| **Volume of NaOH (mL)** | **pH** |
| 0 | 3.18 |
| 10 | 4.15 |
| 25 | 4.76 |
| 40 | 5.36 |
| 49 | 6.45 |
| 49.99 | 8.55 |
| 50 | 8.73 |
| 50.01 | 8.89 |
| 51 | 11 |
| 60 | 11.96 |
| 75 | 12.3 |
| 100 | 12.52 |

* 1. What is the pH at the equivalence point of this titration?
  2. Use the figure to the right to identify one or more acid-base indicators that could be used to determine the end point in this titration.

1. You slowly add 0.1 M NaOH to 50.0 mL of 0.35 M HCl. What volume of NaOH must you add before neutralization occurs?
2. What is the molarity of an H2SO4 solution if 80 mL of the solution reacts with 0.424 g Na2CO3?

H2SO4 + Na2CO3 🡪 Na2SO4 + H2O + CO2

1. How many mL of 3.0 M H2SO4 are required to neutralize 30 mL of 1.0 M NaOH?
2. How many mL of 0.1 M Ca(OH)2 are required to neutralize 25 mL of 0.5 M HNO3?
3. A 1.0-gram sample of K2CO3 is dissolved in enough water to make 250.0 mL of solution. A 25.00 mL sample is taken and titrated with 0.1 M HCl:

\_\_\_\_\_K2CO3*(aq)* + \_\_\_\_\_HCl*(aq)* 🡪 \_\_\_\_\_KCl*(aq)* + \_\_\_\_\_H2O*(l)* + \_\_\_\_\_CO2*(g)*

How many mL of HCl are required to neutralize the solution?

1. During a chemistry lab, you decide to break one of the most important lab safety rules and engage in “horseplay.” While fooling around (aka gambling with your life), you knock over a beaker containing 50 mL of 0.4 M HCl and 85 mL of 0.25 M NaOH. Both liquids spill into your BFF’s water bottle, and she takes a sip without noticing. Is the solution that she consumed acidic, basic, or neutral? What is the pH? Is she going to die?!! Better not horseplay ever again just in case…